

## The Need for Online Testing at The South Carolina Fire Academy

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In 2019, The South Carolina Fire Academy (SCFA) tested 14,083 students in 1,238 courses. All of these tests were completed using pencil and paper. While this accomplishes the goal, SCFA needs to find a more efficient way to test. Online testing is growing rapidly in education. The benefits are; tests are graded automatically; the feedback is immediate and it provides data for analytics. Online testing is the way of the future. Most, if not all non-fire colleges and universities offer online testing with scores and results available immediately after the test is completed. As the new younger generation enters the fire service, moving toward this change is inevitable. But most importantly, this is what our customers want.

The issue of testing in the fire service is very complex for many reasons. Some of the older generation are not well versed on the latest technology and are reluctant to learn how to use newer, more updated technology. The younger generation of firefighters are used to getting answers immediately when using laptops, tablets and of course their cell phones to test. However, both can agree the turnaround time to receive scores and certificates can seem interminable. Online testing has been on SCFA's radar for years. This is one of Superintendent Dennis Ray's goals for SCFA. Obstacles, such as lack of online infrastructure in rural areas as well as lack of funding to provide tablets for each student, are reasons why we have not been able to move forward. Also required is support from the fire service. If we want online testing to be successful, the fire service would have to embrace it.

Currently, in the regional offices at SCFA, classes requiring a pre-requisite are scheduled 75 days apart. This is because of the time it takes to process a course package. Once the class ends, the tests are graded, the course package billed, then it is sent to Columbia for final processing. This includes entering the grades and mailing out certificates. The entire process can take up to four weeks to complete. This is in part because everything is done manually, including the delivery of the tests. Staff members physically take the tests to the students. Since most of the state's fire departments are made up of mostly volunteer firefighters, accommodations are made so that they don't have to travel long distances to test and for their work schedules. If a student fails a test, he or she has two additional chances to take it and pass.. This is important because for career firefighters, taking certain courses and passing the written exams are required for promotions and raises.

In doing research for this paper, I spoke with the Accreditation Manager at SCFA, Chief Julie McCabe, Terry Sheriff, Battalion Chief at Bluffton Township in Bluffton, SC and Erick Adams, Training-Regional Branch Manager at SCFA. In speaking with these members of the fire service, the narrative was the same. Although they hold three very different positions in three very different capacities, they all agree online training would benefit the fire service. However, according to Chief McCabe, "On-line testing can mean many things. Are you testing and proctoring on-line or are having students meet in a classroom with their computers with a proctor present? Each provides different challenges." In addition, she added that "some are hesitant to require online testing due to the burden on rural communities to meet the standard of online testing."

There are still some positives associated with the way we currently test. An example being that the students are in a familiar environment and are more likely to relax and do better on their test. Also, since tests are completed using paper and pencil, there are no connectivity issues. If you have a “walk-in” student, all you have to do is make a copy of the test. But, when done in this environment, there is the possibility of the standard being compromised if the proctor gets distracted. This presents the opportunity for cheating. All this according to Erick Adams who believes that there are better ways to proctor exams.

The way it is done now, proctoring tests involves multiple people. The test is scheduled by the student, a test box is assembled by the accreditation office, someone delivers the test, someone else may proctor the test and then the test has to be graded and then turned in to the main office. Another positive to online testing is flexibility. Students could take a test on their schedule rather than having to make an appointment with a proctor. Online testing would provide substantial savings on the cost of printed test materials as well as man-hours since what we do is very “hands-on”.

While online testing in the fire service isn’t rare, it’s usually administered by a third party which is costlier to the institution. Currently, the average cost for a class including the textbook and the end of course exam is \$5. Some of these classes can be up to 110 hours in length. In addition, students are allowed to retest up to three times at no additional cost if they fail the end of course exam. If we were to hire out our testing system to a third party, the cost could increase to as much as \$90 per test. Since the majority of the firefighters in South Carolina are volunteer, most would not be willing to incur these additional costs. SCFA is unwilling to pass these costs off to the fire departments as well.

For those that want to test but travel is not an option, a proctor is required. The Airport Firefighter Rescue program at SCFA attracts candidates from all over the world. If a student fails the test at the end of the course, s/he has the option to request a retest be taken in her/his home state or country. Typically, we would seek out a superior officer in that student's fire department or organization will identify a proctor for him or her. This person cannot be a direct manager and would receive the test in the mail and be in total control of the test and testing process. This process works well for an individual test but this is still done on paper with a pencil.

Lack of broadband internet access has been in consistent issues in SC for years. Heavily wooded areas especially make it difficult to get access. However, there may be help on the way. South Carolina lawmakers have already vowed to spend \$50 million to improve broadband in the state. In July 2020, the house introduced a bill that would grow broadband in communities and allow business and homes to have high speed internet. In December 2020, the Federal According to Joseph Bustos at The State paper, Communications Commissions is set to send \$121 million over the next 10 years to internet providers in South Carolina to expand broadband access to rural areas in South Carolina. The projects will be carried out over 10 years. Broadband expansion has become more of a priority during the COVID-19 pandemic due to the shift of virtual schooling and doctor's visits transitioning to telehealth visits. While this doesn't solve the problem completely, it is a step in the right direction.

Federal lawmakers from South Carolina have been pushing for increased funding for broadband projects not just in South Carolina, but around the country. To assist people who can't afford high speed internet, senators for SC have proposed creating a fund to pay for

broadband infrastructure development and subsidies. House majority whip, Jim Clyburn proposed the Rural Broadband Acceleration Act to have the FCC accelerate the 10-year process of expansion to one year. In March 2018, Congress provided \$600 million to USDA to expand broadband infrastructure and services in rural America under a program called “ReConnect”. The goal of this program is to bring connectivity to just under 17,000 rural small businesses and other entities.

Coverage by County in South Carolina	
County Name	% Broadband Coverage
Abbeville	96.0%
Aiken	81.8%
Allendale	19.5%
Anderson	96.6%
Bamberg	45.1%
Barnwell	62.9%
Beaufort	89.4%
Berkeley	97.2%
Calhoun	79.9%
Charleston	97.1%
Cherokee	90.8%
Chester	87.8%
Chesterfield	68.9%
Clarendon	94.1%
Colleton	88.7%
Darlington	89.0%
Dillon	76.5%
Dorchester	95.2%
Edgefield	71.7%
Fairfield	74.6%
Florence	94.0%
Georgetown	89.4%
Greenville	98.7%
Greenwood	91.2%
Hampton	51.9%
Horry	100.0%
Jasper	66.3%
Kershaw	90.2%
Lancaster	89.3%
Laurens	91.8%
Lee	88.4%
Lexington	97.3%
McCormick	42.3%
Marion	71.3%
Marlboro	33.3%
Newberry	87.9%
Oconee	92.6%
Orangeburg	64.3%
Pickens	96.6%
Richland	98.7%
Saluda	59.1%
Spartanburg	96.9%
Sumter	96.8%
Union	83.8%
Williamsburg	80.3%
York	97.8%

Once internet access has been installed and online testing is available, is it secure? Due to current social distancing norms, secure online examination systems are in need now more

than ever. However, with the introduction of new technology, comes new concerns about security. Would students be required to use their own device, or would one be provided for them. Most smartphones are able to support online testing, but what if there are issues with connectivity or launching a program. Who would be responsible for troubleshooting?

According to ePravesh, one of the techniques used to make an online exam secure is by using a secure browser. This technology prevents users from opening any other window while the online examination process is ongoing. The only accessible window would be the examination window. In some systems, there is a feature that would show a warning message to the user when the user tries to move away from the exam window. These messages can also be logged. After too many attempts to move away from the exam, the user would be suspended. There are also systems that offer custom pre-installed apps on the machine. These apps have the ability to prevent screen capturing, recording and remote login features.

Proctoring an exam can now be done remotely without a supervisor present by image capturing. Image capturing captures initial images of the candidate and then continues to capture images in 30 second intervals sitting at the remote location. There is also the option of streaming video of the candidate. The remote proctor can log into the system to check the live streaming of the candidate. The proctor can keep tabs on the students while saving costs such as travel.

Keeping test banks secure is paramount in any testing system. When using online testing, it is imperative that the tests themselves do not become compromised or manipulated. According to SCFA policy, all accredited training programs and testing must meet the standards

established by IFSAC and Pro Board with whom we are currently accredited by. The policy the way it is currently written, does not preclude the ability for SCFA to move towards online cognitive testing. “Any advancement in technology that would allow the SCFA to move towards computer-based testing shall not be prohibited or inhibited by the policy as long as test security, validity and reliability can be maintained. All certification level test instruments must be secured. Whether in a locked room or a controlled database system. Only the accreditation coordinator or their authorized personnel shall have access to certification level test instruments.”

It is also equally important that the tests are fair. A test is usually composed of 50-100 questions. But test banks have hundreds of stored questions. If not done properly, test banks could be compromised. Currently, our test bank is not connected to any internet source. However, once we get to the point of online testing, it would be virtually impossible to do this without some sort of web based connection. The only other way is to use tablet or iPads that have the test downloaded on them already.

However, using an iPad or tablet could change the way we do business. According to Rich Mougull, at Macworld, “the iPad is one of the safest computing devices you can use. Its combination of hardware and software security translate to a device that’s probably more secure than your PC or Mac. Because there are currently no known remote attacks against iPads, the biggest security risk is physically losing the device. Thus, the first step is to make sure your tablet’s data is safe in case it’s lost or stolen.”

I recommend online training for all the reasons I have discussed. SCFA and other Fire Service institutions have to get on board in order not to be left behind technologically. Online testing will save time by not requiring paper tests be hand delivered to each to the various fire departments. It will also improve the time it takes a for a fire fighter to gain a promotion since tests results would be available immediately. If a student fails, he is immediately allowed to retest. If he passes the retest, then he is on to the next class and exam. The best way to pilot this is with a live test proctor to start. In the case of a live proctor, this person would oversee an exam. They would start by identifying the person taking the exam by photo ID, record their information and instruct them which seat to take. They would then read all the instructions to the examinees then inform them of the consequences if they fail to follow these directions. The main duty of a proctor is to maintain the academic integrity of the test. In this scenario, students would be required to bring either a laptop or tablet with them to class. They would then be given the credentials to login into the testing website ACS. ACS is. The proctor can observe the students visually and by viewing their status on his/her computer. If a student tries to navigate away from the test, the proctor is notified and can step in.

Ultimately, for online testing to become the norm, the fire service would have to buy in in a big way. And by this, I mean they would need to finance it. Cost wise, there is no way for SCFA to provide enough laptops or tablets to support the entire state. Each of the seven regional offices, eight if you count the main campus would need a minimum of 30 laptops or tablets. Each laptop would cost approximately \$1,500 and tablets would cost about \$1,000 each. Multiply that times eight, and you have a cost of \$360,000. And this is just a very low ballpark figure. Additionally, this total does not include software and maintenance of the



equipment. Even if this was feasible, thirty laptops per region is not enough for the volume of testing that is done on a weekly basis. Most courses that SCFA teach run Monday through Friday all over the state. On some Fridays, there may be as many as eight different end of course exams going on in one region with a maximum of 30 students in the class. That is 240 tests at one time. At the very least, each region would need at least 200 devices minimum to accommodate their regions. This just isn't reasonable for our agency.

A bigger issues lies in the security of the internet at the various fire departments. Even if we could provide the hardware, we would have no control over the how secure the internet is in each fire department. The risk of the hardware getting infected with viruses is high. But more importantly, the tests themselves could be compromised. The integrity of the tests themselves takes precedence over everything else.

Ultimately, the cities and counties in SC are going to have to provide the web-based infrastructure as well as the devices needed for the actual test. Like I stated earlier, students could bring in their own devices to start. But the larger fire departments like City of Charleston, Myrtle Beach, Greenville City, etc. would need to set up a testing center on or their fire department headquarters with either iPad or desktop/laptop computers. SCFA would then give them a code to access the test via ACS. There would need to be a live proctor in the room and the tests are times. Each test would be different. Once the test has begun, the students would not be allowed to have any additional electronic device in the room or navigate away from the testing page. Once the test is over, the test disappears from the screen grades would be available immediately. This preserves the security and integrity of the test which is required to for SCFA to maintain our accreditation status.

The success of this program will be measured in how many man hours are saved by not driving to multiple fire departments delivering test boxes, picking up test boxes, grading the tests and then driving them to the main office in Columbia from all over the state. Success can also be measured in the length of time it takes a fire fighter to get promoted. Instead of a 75-day turnaround for a class and the pre-requisite need for that class, online testing could reduce it to at least half of that.

Even though online testing will eventually happen. There will always be a need for traditional testing according to Chief Ray. Until the rural areas are able move up technologically, especially counties like Marlboro and Allendale where less than one third has reliable broadband, we will continue to provide them with written tests maintain the hybrid method for the foreseeable future.

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